

CLAIMS

WHAT IS CLAIMED:

1. A radio terminal controlling apparatus, comprising:

first receiving means for, from a radio terminal having a first communication interface for connecting to a cellular network and a second communication interface for connecting to an Internet protocol network, receiving a location registration request sent via said second communication interface;

storing means for storing a correspondence between identification information on said radio terminal and an IP address based on said received location registration request;

converting means for, in the case where said location registration request is not in compliance with a standard of said cellular network, converting the location registration request into a location registration message in compliance therewith; and

first sending means for sending to the cellular network the location registration message in compliance with the standard of said cellular network.

2. The radio terminal controlling apparatus according to claim 1, further comprising determination means for determining whether or not the identification information on the radio terminal which is a subject of a search is stored in said storing means.

3. The radio terminal controlling apparatus according to claim 2, further comprising search request means for, in the case where it is determined that the identification information on said radio terminal which is the subject of the search is not stored in said storing means, sending a search request including the identification information on the radio terminal which is the subject of the search to another radio terminal controlling apparatus.

4. The radio terminal controlling apparatus according to claim 2, further comprising transfer means for, on receiving a call set-up request from a first radio terminal

to a second radio terminal, having said determination means perform a determination process as to the second radio terminal, and in the case where it is determined that the identification information on said second radio terminal is stored, reading an address of the second radio terminal and transferring the call set-up request to the read address as its destination.

5. The radio terminal controlling apparatus according to claim 1, wherein said storing means also stores the correspondence between an IP address of the radio terminal controlling apparatus controlling said radio terminal and the identification information on said radio terminal.

6. The radio terminal controlling apparatus according to claim 2, further comprising transfer means for, when receiving a call set-up request from a first radio terminal to a second radio terminal, reading the IP address of the radio terminal controlling apparatus controlling said second radio terminal and transferring said call set-up request to the read IP address as its destination.

7. The radio terminal controlling apparatus according to claim 3, wherein said radio terminal which is the subject of the search is the second radio terminal on receiving a call set-up request from a first radio terminal to a second radio terminal, and in the case where the identification information on the second radio terminal is not stored in said storing means, said converting means converts said call set-up request and said sending means sends said converted call set-up request to said cellular network.

8. The radio terminal controlling apparatus according to claim 1, further comprising second sending means for sending to the radio terminal having its identification information stored in said storing means a location registration prompting message for prompting location registration based on a sending cycle according to the standard of said cellular network.

9. The radio terminal controlling apparatus according to claim 8, wherein said second sending means also sends said location registration prompting message at a time other than said sending cycle according to the standard of said cellular network.

10. The radio terminal controlling apparatus according to claim 8, wherein said location registration prompting message is a message for prompting the location registration with said cellular network by way of said Internet protocol network.

11. A radio terminal controlling apparatus, comprising:
receiving means for receiving, via an Internet protocol network, a first location registration request for registering a radio terminal of a first cellular network with a second cellular network existing in an area different from the area in which the radio terminal exists;
selecting means for selecting a location registration auxiliary apparatus for aiding the location registration with said second cellular network based on said first location registration request; and
transferring means for transferring said first location registration request to said selected location registration auxiliary apparatus.

12. The radio terminal controlling apparatus according to claim 11, wherein a standard with which said first cellular network is in compliance and a standard with which said second cellular network is in compliance are different.

13. The radio terminal controlling apparatus according to claim 11, wherein a region in which said first cellular network exists and a region in which said second cellular network exists are different.

14. The radio terminal controlling apparatus according to claim 11, wherein a country in which said first cellular network exists and a country in which said second cellular network exists are different.

15. The radio terminal controlling apparatus according to claim 11, wherein said radio terminal is also registered with said first cellular network.

16. The radio terminal controlling apparatus according to claim 15 further comprising communication controlling means for controlling a communication state of said radio terminal, in the case where said radio terminal is registered with both of said first and second cellular networks.

17. The radio terminal controlling apparatus according to claim 16, further comprising call controlling means for, on receiving an incoming request from the other network in the case where said radio terminal is in the communication state via one of the networks, exerting control so as to return to said other network a message representing that a call connection is impossible.

18. A location registration auxiliary apparatus for communicating with a radio terminal controlling apparatus according to claim 11, comprising:

converting means for converting said first location registration request received from said radio terminal controlling apparatus into a second location registration request in compliance with the standard of said second cellular network; and

sending means for sending said second location registration request to a location registration register of said second cellular network.

19. The location registration auxiliary apparatus according to claim 18, further comprising a conversion table for converting the first message in compliance with the standard of said first cellular network into the second message in compliance with the standard of said second cellular network.

20. The location registration auxiliary apparatus according to claim 18, further comprising a virtual terminal unit operating in compliance with the standard of said second cellular network.

21. The location registration auxiliary apparatus according to claim 20, wherein said apparatus further comprises:

activating means for activating said virtual terminal unit on receiving said predetermined message; and

assigning means for assigning unique information to said virtual terminal unit which is activated, and

said virtual terminal unit generates a third location registration request for registering said virtual terminal unit with said second cellular network by using said unique information, and sends it to said location registration register.

22. The location registration auxiliary apparatus according to claim 21, further comprising storing means for storing the correspondence between said virtual terminal unit registered instead of said radio terminal and the radio terminal.

23. The location registration auxiliary apparatus according to any one of claims 18 to 22, wherein said radio terminal is also registered with said first cellular network.

24. A radio terminal, comprising:
a first communication interface for connecting to a cellular network;
a second communication interface for connecting to an Internet protocol network;
first message generating means for generating a first location registration message for registering with said cellular network;

second message generating means for generating a second location registration message based on said first location registration message; and

sending controlling means for, controlling said first communication interface to have said first location registration message sent when registering with said cellular network via said first communication interface, and controlling said second communication interface to have said second location registration message sent when registering with said cellular network via said second communication interface and said Internet protocol network.

25. The radio terminal according to claim 24, wherein said radio terminal further comprises:

first measuring means for measuring first signal quality based on a signal received by said first communication interface;

second measuring means for measuring second signal quality based on the signal received by said second communication interface; and

comparing means for comparing said first signal quality with said second signal quality;

wherein the communication interface for sending the location registration message is determined according to results of said comparison.

26. The radio terminal according to claim 24, wherein said second communication interface is a wireless interface for radio-communicating with said Internet protocol network.

27. The radio terminal according to claim 26, wherein said wireless interface includes any one of an infrared interface, a wireless LAN interface and a Bluetooth interface.

28. A radio terminal controlling method comprising the steps of:

from a radio terminal having a first communication interface for connecting to a cellular network and a second communication interface for connecting to an Internet protocol network, receiving a location registration request sent via said second communication interface;

storing a correspondence between identification information on said radio terminal and an address based on said received location registration request;

in the case where said location registration request is not a location registration message in compliance with a standard of said cellular network, converting the location registration request into a location registration message in compliance therewith; and

sending to the cellular network the location registration message in compliance with the standard of said cellular network.

29. The radio terminal controlling method according to claim 28, further comprising a step of determining whether or not the identification information on the radio terminal which is a subject of a search is stored in said storing means.

30. The radio terminal controlling method according to claim 29 further comprising a step of, in the case where it is determined that the identification information on said radio terminal which is the subject of the search is not stored, sending a search request including the identification information on the radio terminal which is the subject of the search.

31. The radio terminal controlling method according to claim 29, further comprising the steps of:

- receiving a call set-up request from a first radio terminal to a second radio terminal;
- reading an address of the second radio terminal in the case where it is determined that the identification information on said second radio terminal is stored as a result of said step of determination performed as to said second radio terminal; and
- transferring the call set-up request to the read address as its destination.

32. The radio terminal controlling method according to claim 28, further comprising a step of storing the correspondence between the address of the radio terminal controlling apparatus controlling said radio terminal and the identification information on said radio terminal.

33. The radio terminal controlling method according to claim 29 further comprising the steps of:

- receiving a call set-up request from a first radio terminal to a second radio terminal;
- reading the address of the radio terminal controlling apparatus controlling said second radio terminal; and
- transferring said call set-up request to the read address as its destination.

34. The radio terminal controlling method according to claim 30, wherein said radio terminal which is the subject of the search is the second radio terminal on receiving

the call set-up request from the first radio terminal to the second radio terminal, and said call set-up request is converted and said converted call set-up request is sent to said cellular network in the case where the identification information on the second radio terminal is not stored.

35. The radio terminal controlling method according to claim 28, further comprising a step of sending to the radio terminal having said identification information stored a location registration prompting message for prompting location registration based on a sending cycle according to the standard of said cellular network.

36. The radio terminal controlling method according to claim 35, further comprising a step of also sending said location registration prompting message at a time other than said sending cycle according to the standard of said cellular network.

37. The radio terminal controlling method according to claim 35, wherein said location registration prompting message is a message for prompting the location registration with said cellular network by way of said Internet protocol network.

38. A radio terminal controlling method, comprising the steps of:
receiving, via an Internet protocol network, a first location registration request for registering a radio terminal of a first cellular network with a second cellular network existing in an area different from the area in which the radio terminal exists;
selecting a location registration auxiliary apparatus for aiding the location registration with said second cellular network based on said first location registration request; and
transferring said first location registration request to said selected location registration auxiliary apparatus.

39. The radio terminal controlling method according to claim 38, wherein the standard with which said first cellular network is in compliance and the one with which said second cellular network is in compliance are different.

40. The radio terminal controlling method according to claim 39, wherein a region in which said first cellular network exists and a region in which said second cellular network exists are different.

41. A location registration method in a radio terminal having a first communication interface for connecting to a cellular network and a second communication interface for connecting to an Internet protocol network, comprising the steps of:

- generating a first location registration message for registering with said cellular network;

- converting said first location registration message into a second location registration message; and

- controlling said first communication interface to have said first location registration message sent when registering with said cellular network via said first communication interface, and controlling said second communication interface to have said second location registration message sent when registering with said cellular network via said second communication interface and said Internet protocol network.

42. The location registration method according to claim 41, further comprising the steps of:

- measuring first signal quality based on a signal received by said first communication interface;

- measuring second signal quality based on the signal received by said second communication interface;

- comparing said first signal quality with said second signal quality; and

- determining the communication interface for sending the location registration message according to results of said comparison.

43. The location registration method according to claim 41, wherein said second communication interface is a wireless interface for radio-communicating with said Internet protocol network.

44. A radio terminal emulation method, comprising the steps of:

- receiving a activation request for activating a virtual terminal unit emulating a radio terminal in compliance with a standard of a cellular network from any user terminal connected to an Internet protocol network;
- activating the virtual terminal unit in said Internet protocol network based on said activation request;
- storing a correspondence between said activated virtual terminal unit and said user terminal; and
- having a location registration request to said cellular network sent by said activated virtual terminal unit.

45. The radio terminal emulation method according to claim 44, comprising the steps of:

- receiving information from said cellular network with said virtual terminal unit; and
- transferring said information received from the cellular network to said user terminal based on said correspondence.

46. The radio terminal emulation method according to claim 45, comprising the steps of:

- receiving an incoming request from said cellular network to said virtual terminal unit;
- and
- reading said correspondence and calling said user terminal.

47. The radio terminal emulation method according to claim 44, comprising the steps of:

- receiving the information from said user terminal with said virtual terminal unit;
- converting said information received from the user terminal into a format in compliance with the standard of said cellular network; and
- transferring said converted information from the user terminal to said cellular network.

48. The radio terminal emulation method according to claim 44, wherein said activation request is an explicit activate or call request.

49. The radio terminal emulation method according to claim 44, wherein, when said virtual terminal unit is activated, unique identification information for the cellular network is assigned to said virtual terminal unit.

50. The radio terminal emulation method according to claim 49, wherein said correspondence is related to the unique identification information assigned to said virtual terminal unit and the identification information on said user terminal.

51. The radio terminal emulation method according to claim 44, wherein said user terminal is a computer having an input-output function of voice or data.

52. The radio terminal emulation method according to claim 514, wherein said computer is connected to the Internet protocol network via a radio channel or a wire circuit.